REMARKS

The present application was filed on June 16, 2000 with claims 1 through 24. Claim 4 was canceled in a previous response. Consequently, claims 1-3 and 5-24 are presently pending in the above-identified patent application. The present amendment amends claims 1 and 12.

In the Office Action, the Examiner rejected claims 1-3, 5-8 and 15-24 under 35 U.S.C. §103(a) as being unpatentable over Piosenka et al. (United States Patent Number 4,993,068, hereinafter "Piosenka") in view of Blonder (United States Patent Number 4,414,684, hereinafter "Blonder"). The Examiner rejected claims 9 and 10 under 35 U.S.C. §103(a) as being unpatentable over Piosenka in view of Blonder and in further view of Jain et al. (United States Patent Number 6,185,318, hereinafter "Jain"). The Examiner indicated that claims 12-14 would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims.

The present invention is directed to methods for signal scrambling and morphing techniques to intentionally distort the original biometrics signal in a non-invertible fashion. If the security is compromised, the system can cancel a particular distortion and reacquire the signal with a new distortion function. This provides functionality as good as non-biometric authentication methods in terms of their power of revocation.

Independent Claims 1 and 22-24

Independent claims 1 and 22-24 were rejected under 35 U.S.C. §103(a) as being unpatentable over Piosenka in view of Blonder.

Regarding the independent claims, the Examiner asserted that Piosenka teaches a distortion process that selectably distorts the first digital representation into a distorted digital representation by distorting at least one of the subcharacteristics, the distortion process being repeatable. The Examiner asserted that Piosenka did not specifically provide for a distortion process that selectably distorts the first digital representation into a distorted digital representation by distorting at least one of the subcharacteristics, the distortion process being repeatable and non-invertible; and a comparison process that compares one or more sets of the distorted subcharacteristics to

one or more stored sets of distorted subcharacteristics to determine the identity of the user. However, the Examiner asserted that Blonder disclosed the latter limitations.

Applicants respectfully submit that Blonder does not disclose the limitations, in independent claims 1 and 22-24, of a distortion process that selectably distorts the first digital representation into a distorted digital representation by distorting at least one of the subcharacteristics, the distortion process being repeatable and non-invertible, and a comparison process that compares one or more sets of the distorted subcharacteristics to one or more stored sets of distorted subcharacteristics to determine the identity of the user.

Applicants read Blonder as providing a system that compares light passing off of a finger to a transparent copy of a fingerprint with blackened lines, for instance, on a card. See col. 5, lines 22-32 of Blonder. Light is bounced off the finger, through two moving wedge prisms, through the transparent copy of the fingerprint, and onto a photodiode. See FIG. 1 and col. 5, lines 34-62 of Blonder. The moving wedge prisms cause a certain output from the photodiode, as shown in reference to FIG. 3 of Blonder. Blonder does state that an optical encoder can be inserted into the light path in order to distort the light. See col. 13, line 49 to col. 14, line 20 of Blonder.

Applicants respectfully submit that Blonder does not disclose the limitation in the independent claims of "a distortion process that selectably distorts the first *digital* representation [of characteristics of a user] into a distorted *digital* representation," as there are no digital representations of characteristics of a user in Blonder. Instead, any representation of characteristics of a user or distortion of the representation in Blonder is performed optically. Moreover, even if Piosenka can, for sake of argument, be considered to operate on a digital representation of a characteristic of a user, there is no motivation for one skilled in the art to combine Piosenka and Blonder, as there is no indication in Piosenka that distortion of a representation would be beneficial and no evidence or implication that the distortion described in Blonder can be performed on a digital representation of characteristics of a user.

Furthermore, there is no teaching that the distortion in Blonder is non-invertible, as claimed in independent claims 1 and 22-24. At page 14, lines 16-18, Applicants state the following:

A cancelable biometrics is a transformation of the biometrics which result in a intentional distorted representation of the same format as the original biometrics. This distortion is repeatable in the sense that, irrespective of variations in recording conditions of the original biometric, it generates the same (or very similar) distorted biometric each time. If the distortion is constructed to be non-invertible then the original biometric can never be derived from the cancelable biometric, thus ensuring extra privacy for the user.

Thus, when the distortion is non-invertible, the original biometric typically cannot be determined. Blonder states, "Examples of optical encoders 54 are additional lenses in the path of the beam having an arbitrary but predetermined refractive capacity, but preferably a telescope-like device is introduced having so-called cylindrical lenses which permit a multitude of modifications and codings." There is no indication in the cited text that the distortion caused by the optical encoders in Blonder are non-invertible.

Finally, Applicants respectfully submit that there is no motivation in the cited art to combine Piosenka with Blonder. Applicants have already presented an argument above arguing that that there is no motivation in the cited art to combine Piosenka with Blonder. Furthermore, Applicants read Piosenka as providing a system that takes credentials of a person such as a facial photograph, retinal scan, voice print, and fingerprint, and stores them on a portable memory device. The credentials are encrypted. See FIG. 1 of Piosenka and col. 3, line 44 to col. 5, line 64 of Piosenka. The Examiner cites Blonder for Blonder's asserted teaching of distortion of fingerprints. However, as stated above, there is no reason for one skilled in the art to add distortion of fingerprints in Blonder to the system of Piosenka. Moreover, the system of Blonder is a complex system based on rotating prism wedges and the signals caused thereby. Adding the system of Blonder to the system of Piosenka would make the resultant system very unwieldy. Additionally, Blonder does not disclose encryption of fingerprints, while the system of Piosenka encrypts all of the credentials of a person. It is unclear that the fingerprints in Blonder could even be encrypted.

Because Blonder does not operate on a digital representation of a characteristic of a user, Blonder does not teach that distortion is non-invertible, and there is no motivation to combine Piosenka and Blonder, Applicants respectfully submit that

independent claims 1 and 22-24 are patentable over Piosenka and Blonder, alone or in combination.

Additional Cited References

Jain was also cited by the Examiner for its disclosure of quantization, and where the distorted digital representation has a larger range relative to the range of the first digital representation. Applicants read Jain as being directed to a system and method for matching a two dimensional pattern of lines by creating a one dimensional representation of one or more points on the lines in the pattern. Jain does not address the issue of distorting at least one of the subcharacteristics, wherein the distortion process is repeatable and non-invertible.

Thus, Jain does not disclose or suggest a distortion process that is repeatable and non-invertible, as required by independent claims 1 and 22-24.

Dependent Claims 2, 3, and 5-21

The Examiner rejected claims 1-8 and 15-24 under 35 U.S.C. §103(a) as being unpatentable over Piosenka in view of Blonder. The Examiner rejected claims 9 and 10 under 35 U.S.C. §103(a) as being unpatentable over Piosenka in view of Blonder and in further view of Jain.

Claims 2, 3, and 5-21 are dependent on claim 1 and are therefore patentably distinguished over Piosenka, Blonder, and Jain (alone or in any combination) because of their dependency from amended independent claim 1 for the reasons set forth above, as well as other elements these claims add in combination to their base claim. The Examiner has already indicated that claims 12-14 would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims.

All of the pending claims, i.e., claims 1-3 and 5-24, are in condition for allowance and such favorable action is earnestly solicited.

If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this application, the Examiner is invited to contact the undersigned at the telephone number indicated below.
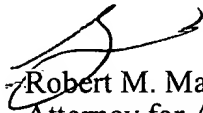
The Examiner's attention to this matter is appreciated.

Respectfully submitted,

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